



# **SERVIR**

Regional Visualization and Monitoring System

## **SERVIR: A Brief Overview**

### **Water Resources Challenges and Approaches**

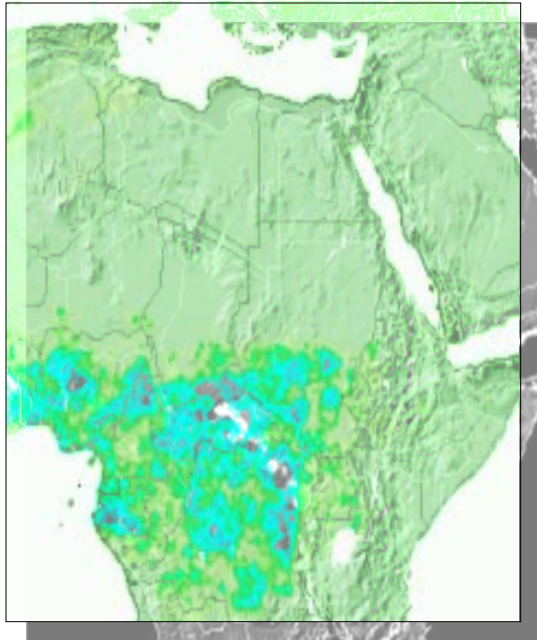
**Ashutosh Limaye**

August 22, 2011



# SERVIR

*Enabling the use of earth observations and models  
for timely decision making to benefit society*



Flood Forecasting in Africa



Training and Capacity Building

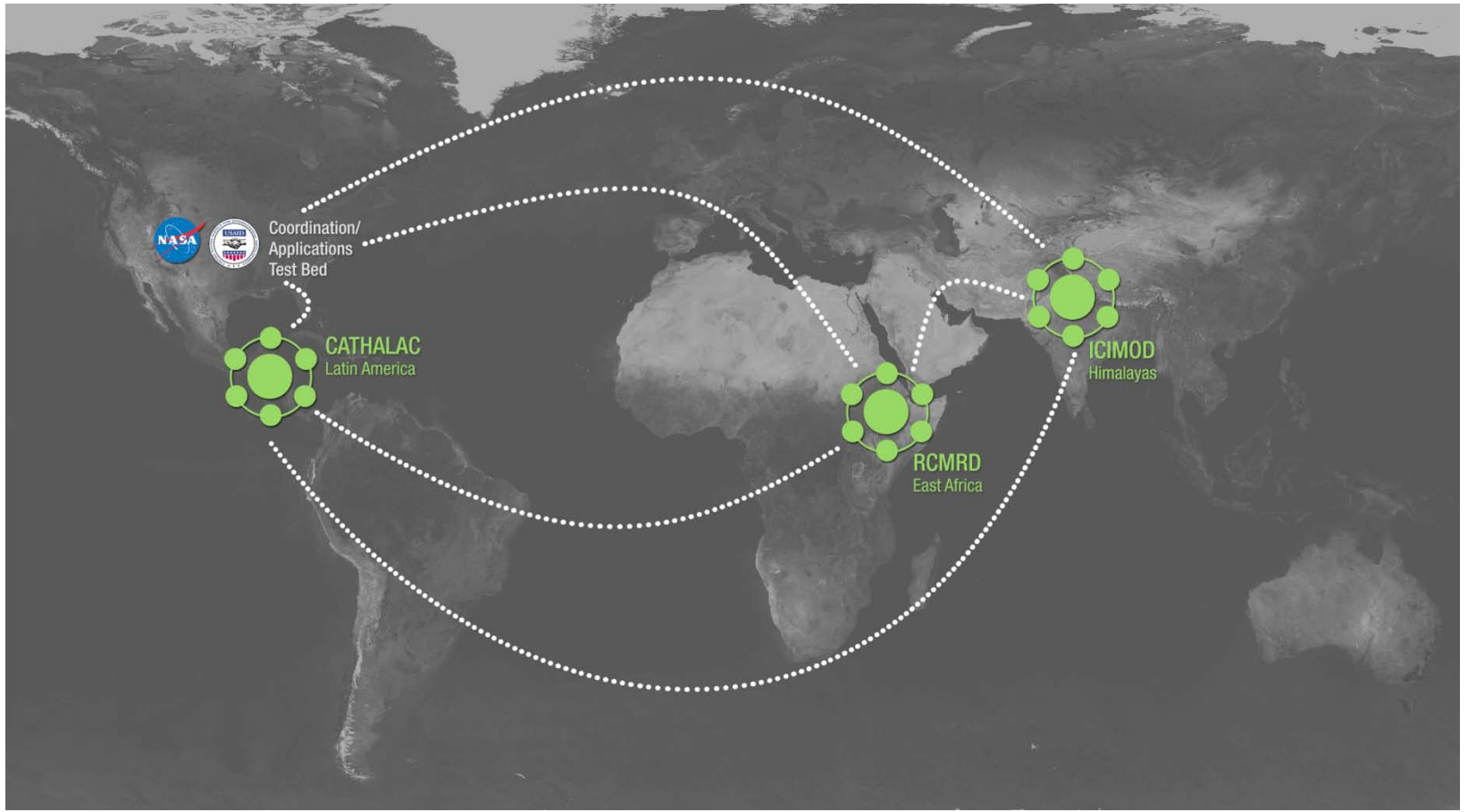


Mapping Fires in Guatemala Mexico

- **Data and Models**
- Online Maps
- **Visualizations**
- Decision Support
- **Training**
- Partnerships

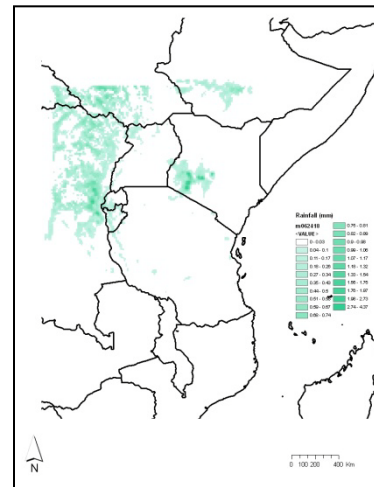
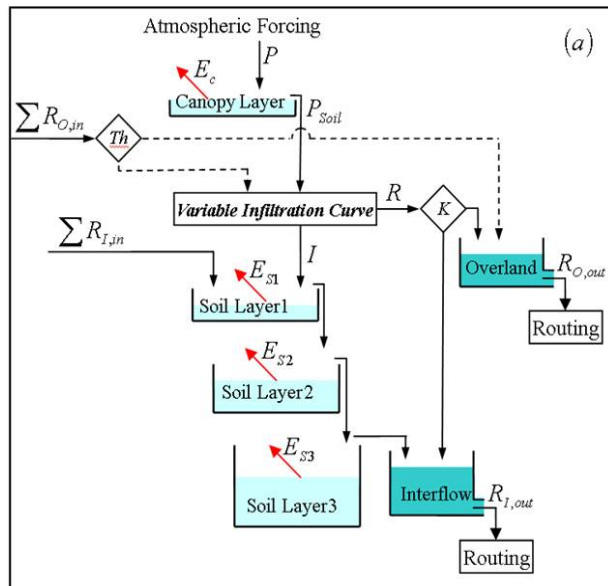


# SERVIR Network

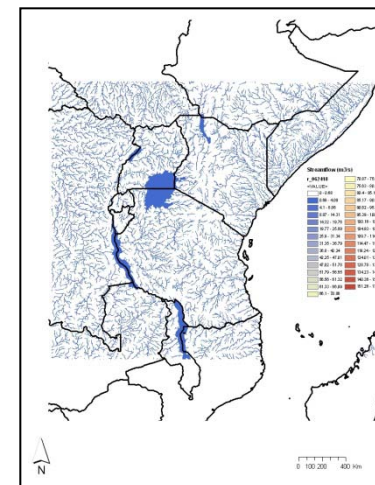


# SERVIR Hydrologic Modeling in East Africa

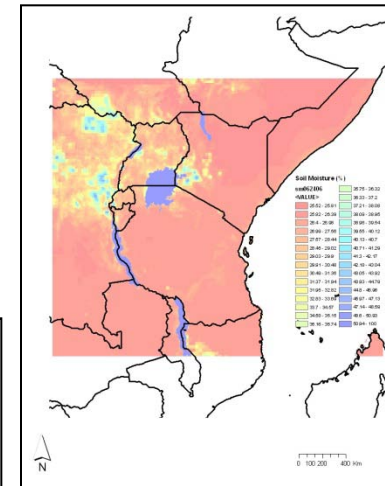
- Spatially distributed hydrologic model CREST (based on Variable Infiltration Capacity (VIC) model)
- Spatial resolution  $\sim 1\text{km}$ , run every 3 hours in near real time mode in the “Cloud”
- Uses near real-time satellite rainfall estimates from TRMM and forecasts from Kenya Meteorological Department (KMD) to produce soil moisture, evapotranspiration & streamflow
- Forecasted soil moisture, evapotranspiration and streamflow will enable KMD to issue early flood warning, especially in the flood prone watersheds in western Kenya.



KMD QPF



Streamflow

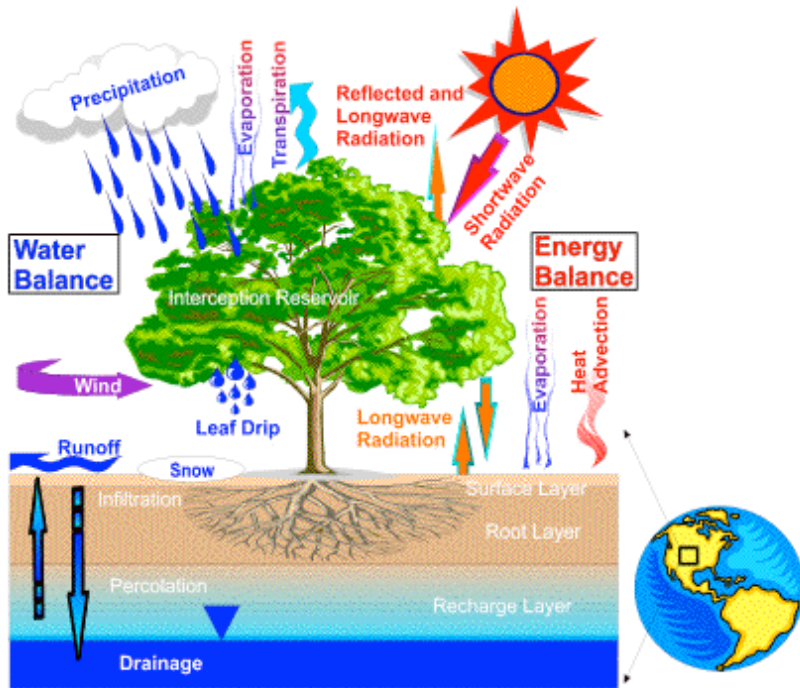


Soil Moisture



# Baseline Datasets

## Land Surface Modeling Concept



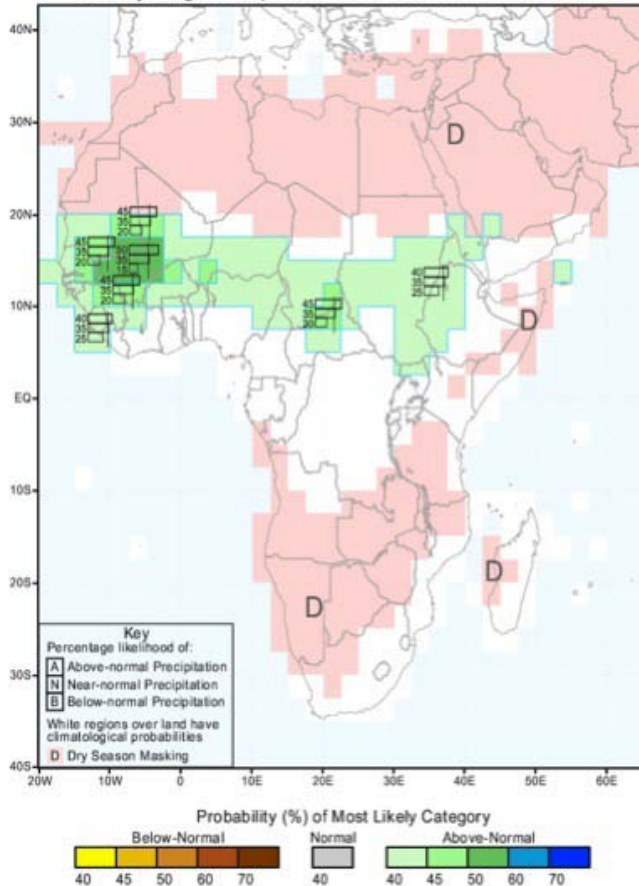
- Hydrologic observations do not exist in majority of the watersheds in the KMD domain.
- To generate modeled historic data, we have using a Global Reanalysis datasets (1949 – 2009), at refined scale using NASA Land Information System (LIS).
- These historic long-term data will provide the historic perspective to the near real time model estimates and to quantify hydrologic extremes including floods and drought.





# Incorporating Seasonal Outlook

IRI Multi-Model Probability Forecast for Precipitation  
for July-August-September 2011, Issued June 2011



- Ensembles of seasonal forecasts need to be factored in the hydrologic predictions.
- Historic reanalysis allows us to assess the “normal”, “above” and “below” conditions.
- Expect to produce the hydrologic forecasts with the seasonal forecasts (target: end of the year).



# SERVIR One-Stop Web Portal

The screenshot shows the 'SERVIR-EAST AFRICA' Geospatial Catalog. The header includes navigation links: SERVIR Home, About SERVIR, Regions, Themes, Products, News, and Community. Below the header, the 'East Africa - Geospatial Catalog' section provides an overview of the catalog's purpose. A 'Geospatial Catalog Advanced Search Options' panel on the left allows users to filter results by Topic, Time, and Location. The main content area displays search results for 'Rift Valley fever in Africa and Middle East', including a descriptive paragraph and a map showing the distribution of the disease. The footer features logos for USAID, NASA, ICIMOD, and GEO, along with a copyright notice for 2010 SERVIR.

Geospatial Catalog

The screenshot shows the 'SERVIR-EAST AFRICA' Interactive Web Maps interface. The header is identical to the Geospatial Catalog page. The main content area, titled 'East Africa - Interactive Web Maps', explains the Web Mapper interface and provides a note about potential service issues. Below this, a 'Catalog' panel on the left lists various data layers such as Earthquakes, Fires, Floods, Storms, Volcanoes, Ecosystems, Health, Infrastructure, and Weather. The main map area displays a map of East Africa with various data layers overlaid. A 'Layers Currently in Map' panel on the right shows the selected layers: 'Rainfall, Latest 3-Hour Estimate' and 'Water Requirements'. The footer features logos for USAID, NASA, ICIMOD, and GEO, along with a copyright notice for 2010 SERVIR.

Interactive Web Maps

# SERVIR Web Portal



SERVIRBETA.NET

INSTRUCTIONS ▾

## Clip, Zip & Ship

Download SERVIR datasets by following the steps below.

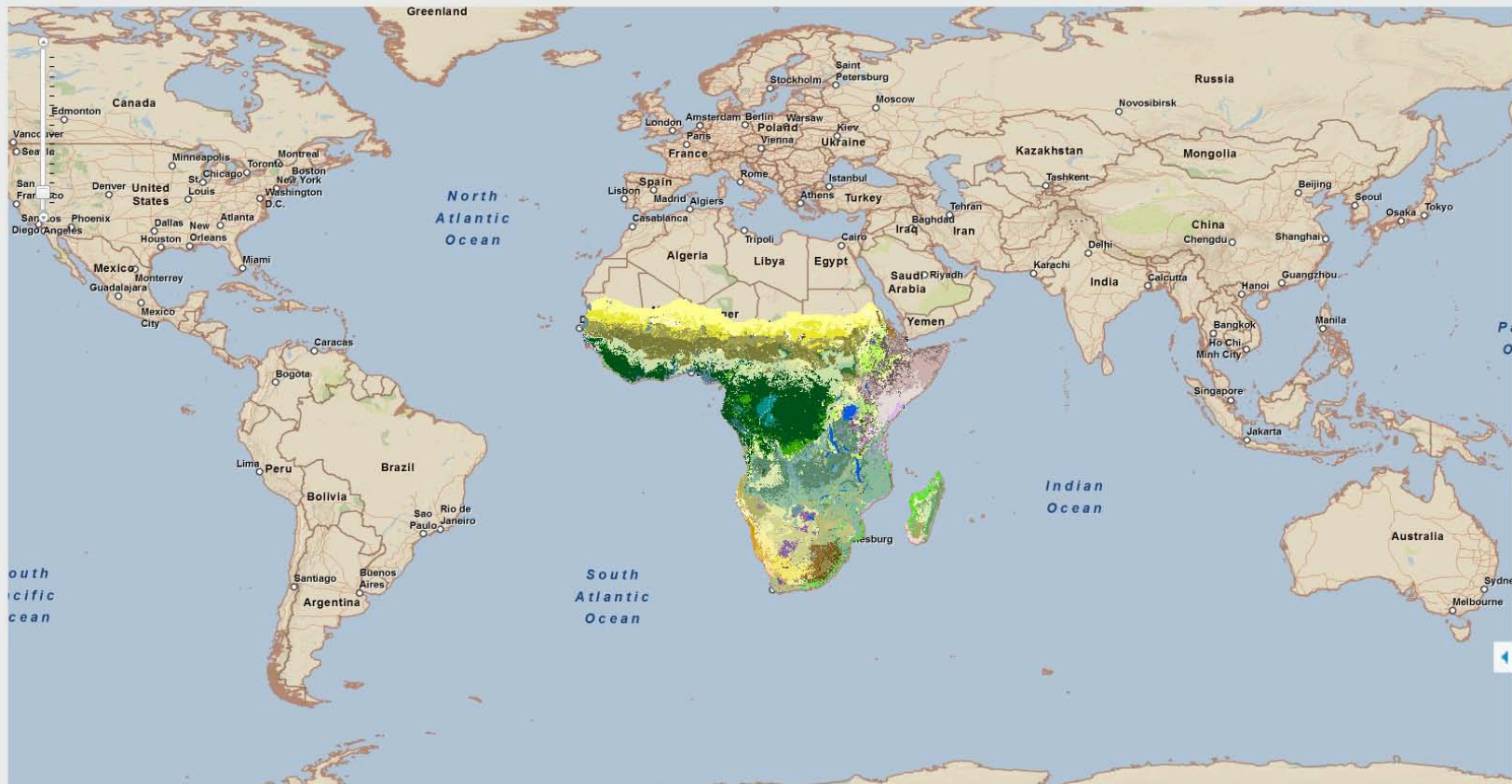
STEP 1: Enter your e-mail address:

STEP 2: Click the button to activate clipping mode.

START DRAWING ON MAP

## Map Contents

- ☒ USGS\_Ecosystems
  - ☒ Terrestrial Ecosystems
  - ☐ Surficial Lithology
  - ☐ Isobioclimates
  - ☐ Land Surface Forms
  - ☐ Topo Moisture Potential
- ☒ Agriculture
  - ☐ Soil Types
  - ☐ Harvest Plus Farming Systems
  - ☐ Dixon Farming Systems
  - ☐ FAO Soils
  - ☐ FAO Soil Fertility
  - ☐ Pasture
- ☒ Biodiversity
  - ☐ World Protected Areas
- ☒ Climate
  - ☐ Average Precipitation
  - ☐ Average Temperature
- ☒ Health
  - ☐ Health Poverty Index
  - ☐ Proportion of underweight children < 5 years
- ☒ Ecosystems
  - ☐ Forest Cover
  - ☐ Land Use
- ☒ Infrastructure
  - ☐ OSM\_PrimaryRoads
  - ☐ OSM\_Roads





# In a Nutshell...

- SERVIR is a joint USAID – NASA effort, which uses remotely sensed data and products for societal benefit.
- SERVIR currently has three hubs, in Mesoamerica, East Africa and Himalaya.
- Collaborations are key. SERVIR is continuing to develop strong, working collaborations with government entities, such as KMD.
- Science Applications, IT infrastructure and capacity building is central to SERVIR efforts.



**Thank you...**



# SERVIR Applications

SERVIR Applications have several dependencies:

- **NASA Applied Science Program**

Agriculture, climate, disasters, biodiversity, public health & air quality, and water resources

- **GEO**

Agriculture, biodiversity, climate, disaster, ecosystems, and human health

- **USAID**

Climate change adaptation, Terrestrial carbon assessment and GEO focus areas

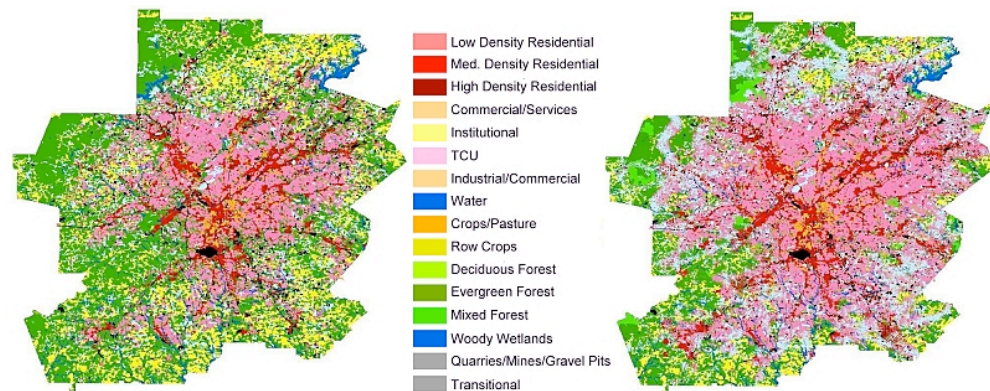
- **Regional Needs Assessment**

All SERVIR science Applications are supported by identified needs



# Land Cover and Land Cover Change

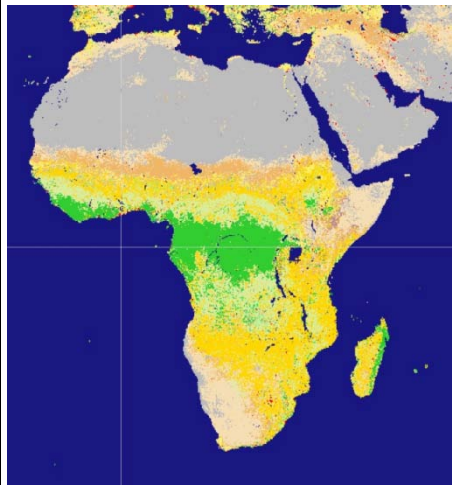
- SERVIR-East Africa is participating in a USEPA project to quantify land use change and greenhouse gas inventory in east Africa. USFS has initiated planning for Himalayan region.
- In the long term, SERVIR-East Africa would like to link land use land cover change to hydrologic assessments. These inventories, and future land cover scenarios will bring improvements in the hydrologic assessments and will also enable the end users in the region with quantitative information to better prepare for adaptation.





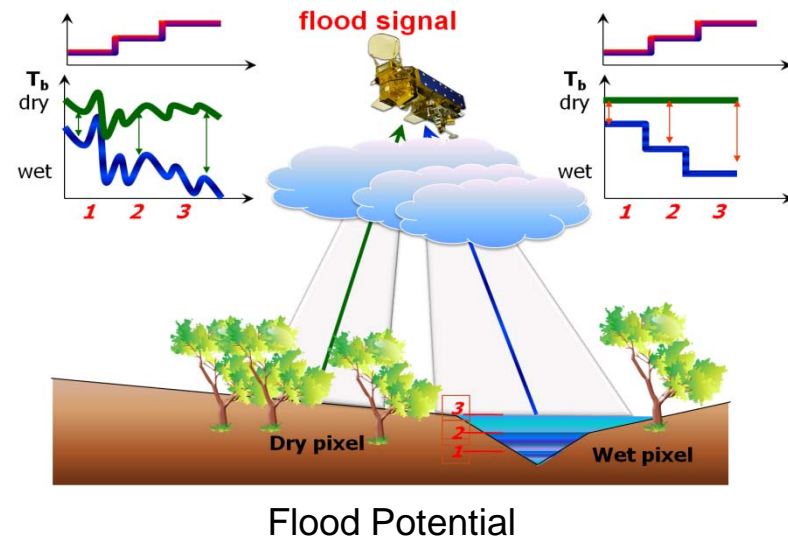
# Land Cover and Land Cover Change

- SERVIR is putting together a plan to develop three temporal slices of land cover maps over a region in east Africa using medium resolution (30m Landsat multi-spectral imagery)
- Plan includes training ground sampling crew for collection of validation data and training the in-country technicians in land cover classification and assimilation of validation data
- SERVIR will perform quality assessment and accuracy assessment quantification
- This assessment will also enable linking and quantifying changes to the hydrologic regime



# Assimilating Remotely Sensed Streamflow in Modeled Estimates

- Later this year, we plan to assimilate microwave-based streamflow estimates (TRMM and AMSR-E) into the CREST model.
- Spatial resolution of the microwave products will be coarser, but will provide a temporal signal of statistical significance, which will result in improved initializations for the forecast runs.
- Additional data and methods for assimilation are valuable, and will provide improved forecasts.



# SERVIR @ CATHALAC

City of Knowledge, Panama

Inaugurated on February 3, 2005





# SERVIR-Africa @ RCMRD

## Nairobi, Kenya



Inaugurated on  
November 21, 2008



Daniel  
Database Mgt  
Specialist

Erick  
Project Lead  
at  
RCMRD



Catherine  
Remote  
Sensing  
Analyst

Tesfaye  
Senior Scientist



Lawrence  
RCMRD  
Database  
Manager



Wafula  
IT System  
Administrator



John  
Web services  
Specialist





# SERVIR-Himalaya @ ICIMOD

## Kathmandu, Nepal



Inaugurated on  
October 5, 2010

